



Course Title: Digital Signal Processing
Date: -11-2016 (Mid term exam)

Course Code: CCE3116
Allowed time: 45 minutes

Year: 3rd
No. of Pages: (1)

Answer the following questions.

Problem number (1) (10 Marks)

(a) Consider the discrete-time sequence $x(n]$:

$$x(n) = \{2, -1, 2, 1, -2, 1, -2\}$$

Sketch

(i) $y_1(n) = x(-n)$

(ii) $y_3(n) = x(-n - 2)$ $\hookrightarrow n+2$

(iii) $y_4(n) = x(-n + 2)$ $\hookrightarrow n-2$

(b) State whether the following system are static, linear, shift invariant, causal, and stable or not.

(i) $y_1(n) = x(n^2)$

(ii) $y_2(n) = \sum_{k=-\infty}^n x(k)$

Problem number (2) (10 Marks)

(a) A difference equation describing a digital system is given by:

$$y(n) + 0.5y(n-1) = 2(0.8)^n u(n)$$

(i) Solve the difference equation to find $y(n]$.

(ii) Find the initial and final values of the system response $y(n]$.

(iii) Check the system stability.

(b) Find the inverse Z-Transform of the following functions:

$$X(z) = \frac{z + 4ze^{-1}}{(z-4)^2} + \frac{3ze^{-1}}{z+1}$$

(c) Compute the circular convolution, $y(n) = x_1(n) \circledast x_2(n)$, where

$$x_1(n) = \{1, 1, 0, -1, 1\}$$

$$x_2(n) = \{1, 2, 2, 1, 1\}$$

Good luck